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SCIENTIFIC INFORMATION REPORT

Chemistry and Metallurgy

(25)

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SCIENTIFIC INFORMATION REPORTChemistry and Metallurgy (25)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly; the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. CHEMISTRY

Agricultural Chemistry1. NRV and New Mineral Organic Microfertilizer Are Made From By-Products of Soap and Oil Refining Industries

"A Large Reserve," by G. Belyakov, Chief of the Central Scientific-Research Laboratory of the "Orgtekhstroy" Combine;
Riga, Sovetskaya Latvija, 26 Oct 62, p 2

Waste materials from petroleum refining contain 80% of the materials needed for the production of NRV (petroleum growth substance). A 40% solution of NRV can be made by steaming together for a short time petroleum asphalt sulfates, sulfuric acid sludge, and sodium hydroxide waste from the soap industry. This process can be completed in a unit augmented to a refinery (for example, the Riga refinery which discards enough waste each year to supply twice the NRV needed by the whole Pribaltika) at a cost similar to that of NRV produced at the Baku plant.

The higher sulfuric acid content of petroleum asphalt sulfates from the refining of white oils make it more suitable in the production of a mineral organic microfertilizer developed by Prof D. Guseynov, who also developed NRV. This fertilizer may be prepared from pyritic ashes from the Riga superphosphate plant, for example. These ashes are 80% oxides of iron, manganese, copper, aluminum, zinc, and sulfur. Mixing petroleum asphalt sulfates and pyritic ashes with some water and waste sulfuric acid causes an exothermal reaction, the result of which is the new complex mineral organic microfertilizer. This method is simple and can be performed by regional kolkhozes and sovkhozes in dry clay pits.

This fertilizer increases the yield of commercial crops and vegetables. Used at a rate of 30 kg/hectare, it increases tomato yield 48% and cabbage yield 28%.

2. Sovkhoz Tests Compare Various Defoliants

"Defoliation Should Be Effective and Cheap," by A. Imamaliyev, Candidate of Biological Sciences, and M. Basevich, agronomist-economist; Tashkent, Narodnoye Khozyaystvo Uzbekistana, Vol 8, No 4, 1962, pp 53-55

The "Malek" Sovkhoz and the Sovkhoz imeni Five-Year Plan of Uzbekistan collect all their cotton by machine.

The following table shows findings of the Malek Sovkhoz in comparative tests of defoliants:

	<u>Cost of Treating One Ha (in rubles)</u>	<u>% of Defoliation</u>	<u>% of Increase in Opening of Pods</u>
Magnesium chlorate	5.72	70-85	25-45
Calcium cyanimide	7.64	55-75	20-35
Calcium cyanimide with water	7.83	60-80	20-38
Calcium cyanimide with sodium fluosilicate	10.68	65-80	25-35
Calcium cyanimide with calcium nitrate	16.75	65-82	25-40
Free cyanimide	27.15	70-90	30-50
Calcium cyanimide (sprayed from a tractor)	6.35	55-75	20-35

Increased production would lower the cost of the expensive but highly effective free cyanimide.

3. Pentachlorophenol, Endotal, and Butyphos Compared for Drying and Defoliation of Cotton Plants

"On the Relative Toxicity of the Poisonous Chemicals Pentachlorophenol, Endotal, and Butyphos Tested in Cotton Rasining With the Aim of Drying and Defoliating Cotton Plants," by N. I. Smetanin and R. I. Danilova, (Sb. nauchn tr. Tashkent. med. in-t (Collected Scientific Works of the Tashkent Medical Institute), No 20, 1961, pp 111-118 (from Referativnyy Zhurnal -- Khimiya, No 19, 1962, Abstract No 19L285, by A. Ryshka)

"The tested preparations are listed according to the size of their LD₁₀₀ for mice: pentachlorophenol <endotal <butyphos. However butyphos is by far less toxic than mercaptophos. Cotton plants lose their toxicity to warm-blooded animals 3-4 days after being treated with butyphos."

4. Maleic Acid Hydrazide Used As Protective Film for Plants

"On the Problem of Using Biologically Active Materials for Protection of Plants," by N. A. Kozlova and Ye. Ya. Yermolayeva, Materialy Simpoziuma po primeneniyu biofiz. v obl. zashchity rast. (Materials of the Symposium for the Use of Biophysics in the Field of Plant Protection), Leningrad, 1961, pp 9-10 (from Referativnyy Zhurnal -- Khimiya, No 19, 1962, Abstract No 19L289, by A. Ryshka)

"Maleic acid hydrazide favors rapid formation of mechanical films which protect plants from suctorial pests. It favors the build up of starch in the leaves and does not attract aphids in distinction from gibberellins, which also promote the build up of soluble carbohydrates."

Insecticides and Fungicides

5. Field Testing of New Fungicides Done by Toxicology Labs

"Results of Testing New Fungicides," by A. A. Shumakova, Candidate in Agricultural Science; Moscye, Zashchita Rasteniy ot Vreditel'nykh Bol'ezney, No 10, 1962, pp 29-30

"Broad testing of fungicides was done by toxicology laboratories in 1961 in accordance with the plan set up by the State Committee for Chemical Methods for Combating Pests, Diseases, and Weeds of the Ministry of Agriculture, USSR.

C-O-N-F-I-D-E-N-T-I-A-L

"More than 40 simple and multiple disinfectants were tested to find a replacement for mercury disinfectants, which are highly toxic for warm-blooded animals, and also to find a more successful fungicide and insecticide combination. Experiments were done on wheat, corn, and sugar beets.

"Wheat was treated with GKhB (hexachlorobenzene), TMTD (tetramethyl thiuram disulfide), thiar sine (diethylphenoxyarsine dithiophosphate), tributol-4, zinc chromate, phenanthraquinone, and the following combined insecticides: GKhB and TMTD with a gamma-isomer of GKhTsG (hexachlorocyclohexane) and with various amounts of gamma- and delta-isomers; thiar sine with phenanthraquinone and gamma-isomer of GKhTsG and heptachlorine were as effective as granosan and mercuran against wheat smut. Tributol-4 and zinc chromate had only weak effects.

"The following combinations were tested on corn: TMTD with a gamma-isomer of GKhTsG, TMTD with gamma- and delta-isomers of GKhTsG, and TMTD with heptachlorine. Fifty TMTD with heptachlorine was found to be at least as effective as mercuran against wire worms and corn seed and seedling diseases. Its application increased germination and kernel and leaf production. TMTD, both alone and in combination with delta- and gamma-isomers of GKhTsG, rated highly in tests of the All-Union Sugar Beet Institute against root borers. As fungicides, these preparations were about as effective as granosan and had about the same effect on the plants in other respects (on thickness of stand and on beet and sugar yield).

"The disinfectant TMTD with GKhTsG and heptachlor was recommended as a replacement for granosan and mercuran against wire-worms, wheat smut, corn seed and seedling diseases, and beet root rot. Thiar sine and thiar sine with GKhTsG are undergoing further field testing.

"Other fungicides were tested for use during the crops' vegetation period to use as replacements for costly copper-containing preparations and to find new compounds against parasitic fungi. 'Tsiram' (zinc dimethyldithio carbamate) and 'figon' (2,3-dichloro-1,4-naphthoquinone) were tested in the form of 50% wetted powders. 'Tsiram' was used against apple scab, grape mildew, and potato blight and was found; in one% concentrations, to be as effective as Bordeaux mixture against the first two illnesses. The addition of 0.1% copper oxychloride or copper sulfate to tsiram increased its effectiveness against apple scab and, in several cases, against grape mildew, and it improved the condition of the sprinkled plants.

"'Tsiram,' especially with added copper compounds, greatly increased the potato yield. It also was as effective as Bordeaux mixture against potato blight in its early stages, though less effective in later stages.

C-O-N-F-I-D-E-N-T-I-A-L

"The preparation was also effective against citrus and currant anthracnose, tomato macrosporiosis, leaf blotch, strawberry grey mold, and cherry leaf spot. In the Georgian toxicology laboratory, tsiram mixed with colloidal sulfur was used simultaneously against both apple scab and powdery mildew. The preparation has been recommended for production.

"Industrial tests showed 'figon' to be a very effective fungicide. It was at least as effective as Bordeaux mixture against apple scab, grape mildew, and potato blight. In concentrations of 9.3-9.5%, it caused burns on apples and grapes.

"One % figon completely prevents mildew on grapes and suppresses the development of fungus, according to tests done in the Moldavian laboratory. Most specialized tests showed it also to be useful against parasitic fungi on apples, grapes, berries, melons, vegetables, and roses.

"Figon has been found particularly effective against rice blast. In tests by the All-Union Institute for Plant Protection of the Krasnodarsk Kray, after two air sprayings, infection decreased from 25.5% to 2.9% and grain yield increased by 7 centners/hectare. Also, early spring applications are effective against infectious drying in seeded gardens, Dutch elm disease, plum coryneum blight, potato macrosporiosis, strawberry gray mold and leaf spot, and cherry leaf spot. Of the large number of fungicides tested, including Bordeaux mixture, figon came out on top. It has been recommended for production and for use against rice blast and for early spring spraying of fruit. Further tests are being run.

"Field tests were run in 1961 on the following foreign and domestic fungicides: phaltan-phtalan (N-trichloromethylthipthalimide), 'diren' (2,4-dichloro-6-O-chloroaniline-S-triazine), 'glyoxide-drey-(2-heptadecylimidozoline), 'khemotsid' (cetyltrimethylammonium bromide), 'kadminat' (cadmium succinate salt of an organic acid), colloidal copper oxychloride, 'kupronaft,' dinitrocyanozen benzene on colloidal copper oxychloride, 'kupronaft,' dinitrocyanozen benzene on colloidal sulfur, 'tsineb,' and 'karatan.' The foreign 'phaltan' and domestic 'phtalan' were the most widely tested of the above substitutes for Bordeaux mixture. In concentrations of 0.3-0.7% (0.5% is optimum), they were very effective against apple scab, grape mildew, and potato blight and showed no phytocidal qualities.

"They were also very effective against parasitic fungi on apples, grapes, and roses and showed promising results against gray mold on strawberries and grapes. Phtalan may be especially useful against gray mold on mature fruit since it is not harmful to people (LD₅₀ 10 g/l kg). The preparation is also interesting since it acts simultaneously against many fungi.

C-O-N-F-I-D-E-N-T-I-A-L

"Diren was very effective against potato blight and macrosporiosis, apple scab, grape mildew, strawberry diseases. Used in 0.5 to 0.7% concentrations, it equaled Bordeaux mixture and the new organic fungicides ('tsineb,' 'tsiram,' 'figon'); it did not cause burns and significantly increased potato yield.

"Copper oxychloride gave excellent results in 1.0 and 1.5% concentrations against apple scab and potato blight. It was somewhat successful against grape mildew, and on Kal'vil' snow apples (in the Ukraine) and Rozmarin apples (in the Crimea) it caused a net on the fruit, characteristic of copper fungicides.

"A 10% suspension of 'kupronaft,' prepared using copper naphthanate, acted as strongly against apple scab and currant anthracnose as Bordeaux mixture. Its effect on mildew was weaker. Several laboratories expressed dissatisfaction with the form of the preparation.

"Although 0.1 and 0.3% 'khemotsid' is very active against apple scab, grape mildew, and potato blight, it has strong phytocidal effects.

"Comparative testing is continuing on dinitrorodan benzene on colloidal sulfur (20% DNRB and 70% colloidal sulfur) and on colloidal sulfur alone. Their effect is practically identical on apple scab and powdery mildew and on grape fungus. DNRB on colloidal sulfur caused burns on apples but not on grapes.

"'Glyoxide' gave unsatisfactory results. In 1, 2, and 3% concentrations it was less effective than Bordeaux mixture against apple scab and grape mildew, and it caused burns on grapes in the Krasnodarsk Kray.

"Several preparations were tested for use against parasitic fungi. 'Karatan' -- dinitro (1-methylheptyl)-phenylcrotonate -- in concentrations of 0.1, 0.15, and 9.2% was effective against powdery mildew on apples, cucumbers, strawberries, and roses and also against grape fungus and American powdery mildew on gooseberries. It shows no harmful effects and has been recommended for further testing.

"Tests of the All-Union Institute of Plant Protection showed the soil fungicide carbothione (vapam) to be effective against cabbage ruptures and black foot and aster fusariosis. These tests also established the preparation's range of action against various fungi in various soils and temperatures. Carbothione is also an excellent soil disinfectant for young cabbage plants. It is presently being studied for its effectiveness against fusariosis and verticillium wilt of various crops.

"Another soil fungicide, 'milon,' is presently being used in field tests against cabbage seedling diseases and fusarium wilt of flowers."

6. Detection Methods for Toxic Chemicals

"Simple Methods for Detecting Toxic Chemicals," by N. G. Berim and R. E. Sokolovskaya, lectures at the Leningrad Agricultural Institute; Moscow, Zashchita Rasteniy ot Vrediteley i Bolezney, No 10, 1962, pp 35-37

Organic Sulfur Compounds

Sulfanate ester: (1) Boil in 2N HCl, add hot barium chloride solution, filter, and cool. Filtrate becomes cloudy.

(2) The addition of benzidine hydrochloride HCl solution causes a white crystalline precipitate.

(3) Mix small amount of the powder with 3-5 ml of NaOH or KOH; boil 2-3 minutes. Cool, filter, and add enough HNO_3 to cause a weak acid reaction with litmus. Addition of silver nitrate forms a white suspended precipitate.

Preparation No 23: (20% powder of ethyl ester dimethyldithiocarbamic acid)

(1) Add 30 ml concentrated HCl and 30 ml H_2O to a small amount of the powder in a flask equipped with a drain tube containing lead foil. Place the end of the pipe in $\text{Ba}(\text{OH})_2$ solution. Boil flask contents for 0.5 hr. Lead foil darkens and $\text{Ba}(\text{OH})_2$ turns light yellow.

(2) Heat and filter a solution of the powder with HCl. Addition of a little potassium permanganate solution bleaches the mixture.

50% TMTD: (1) Follow step No 1 for Preparation No 23. $\text{Ba}(\text{OH})_2$ turns cloudy white and lead foil darkens.

(2) A paste of the powder with HCl darkens a copper plate.

Fuklazin (20% moistened powder of iron dimethyldithiocarbamate)

(1) Follow procedure for step No 1 for TMTD. Results are similar.

C-O-N-F-I-D-E-N-T-I-A-L

(2) Filter the remaining solution. Addition of potassium ferrocyanide causes a blue precipitate; ammonium thiocyanate solution produces a light red color.

Tsineb (50% moistened powder of zinc ethylene biodithiocarbamate) HCl to the powder causes H_2S . Lead foil darkens as soon as it comes in contact with the flask. $Ba(OH)_2$ solution clouds as for TMTD and fuklazin.

(2) The filtrate of the remaining liquid forms a blue precipitate with potassium ferrocyanide and a yellow precipitate with potassium ferricyanide.

Organic Mercury Compounds

NIUIF-2 (granosan): (1) Boil a mixture of the powder with HNO_3 . Cool and filter. The filtrate takes on an iodine color when potassium iodide is added and forms a white insoluble precipitate with silver nitrate.

(2) Make a paste of the powder with HCl. Insert a copper plate for 15-20 min. Under the gray deposit will be found a mercury film.

Mercuran: (1) Follow steps 1 and 2 for NIUIF-2 to obtain the same results.

(2) Follow steps 1 and 2 for 12% hexachlorane dust (Zashchita Rasteniy ot Vrediteley i Bolezney, No 8, 1962) to obtain same results.

Phenoxyacetic Acid Derivatives

2,4-D Sodium Salt: (1) To the filtrate of a water solution of this powder add a few ml of HNO_3 , mix, and add $NaNO_3$ in concentrated H_2SO_4 to obtain a yellow suspension topped by an amorphous precipitate which soon settles out.

(2) A few drops of phenolphthaleine turns a water solution of this powder red.

2,4-D amine salt (1) A sulfuric acid solution of sodium nitrate added to a water solution of this material causes a heavy brown colloidal precipitate which rises to the top before settling.

2,4-D, butyl ester (1) Follow the same procedure as for amine salt 2,4-D. A whitish precipitate will form, covered by an oily band.

2M-4X, sodium salt (dikoteks 8) (1) Follow the same procedure as for 2,4-D. An orange suspension will form.

Other Synthetic Organic Compounds

Figon (50% moistened powder of dichloronaphthoquinone) (1) Dissolve powder in carbon tetrachloride or dichloroethane. Filter. To the filtrate add diethylamine in an alcohol solution of KOH. A bright red color appears which subsequently darkens.

IFK (isopropylphenylcarbamate) (1) Follow step No 1 for Preparation No. 23. Crystals form in the flask containing barium hydroxide, but the solution remains colorless. When the boiling is finished, crystals will form in the barium hydroxide solution itself.

Cooper Trichlorophenolate (1) Add 3-5 ml of sodium hydroxide or potassium hydroxide to a little of the powder. Heat for several minutes. The powder turns first bluish-gray and then dark gray.

(2) To the cooled and filtered liquid add some silver nitrate solution. An abundant white precipitate forms, which quickly darkens.

(3) Boil a hydrochloric acid solution of the powder for a few minutes. Cool and filter. The filtrate turns blue with the addition of plenty of ammonia and forms a slight reddish-brown precipitate with the addition of potassium ferricyanide.

Alkaloids

Anabesine sulfate (1) A water solution of this preparation forms a reddish-brown precipitate with the addition of a potassium iodine solution of iodine and forms a white precipitate with a solution of barium chloride.

Nicotine sulfate (1) Follow same procedure as for anabesine sulfate to obtain the same results.

7. Red Sea Onion Bulbs Used As Rat Poison

"New Means and Methods of Combating Rodents in Animal Husbandry," by N. I. Nikiforov, Tr. Vses. n.-i. in-ta vet. sanitarii (Works of the All-Union Institute of Veterinary Sanitation), No 19, 1961, pp 18-189 (from Referativnyy Zhurnal -- Khimiya, No 20, 1962, Abstract No 201297, by A. Ryshka)

"Red Sea onion bulbs collected from June to September are most effective. The lethal dosage of dry onions for rats is 200-400 mg, while that of raw onions is one g/kg. The onions are given to the rodents in 10% concentrations. 'Zoocoumarin,' 'dephenantsin,' and 'odra-forte' were studied under industrial conditions."

8. Dry and Wet Aerosols Compared for Disinfection of Damaged Granaries

"Use of Aerosols for Disinfecting Cracked and Split Granaries," by V. I. Oliferenko, Tr. N.-i. in-ta zashchity rast. Kazakhsk. akad. s.-x. nauk (Works of the Scientific-Research Institute of Plant Protection of the Kazakhstan Academy of Agricultural Sciences), No 6, 1961, p 250-253 (from Referativnyy Zhurnal -- Khimiya, summary volume, No 19, 1962, Abstract No 19L238, by A. Ryshka)

"A 10% DDT solution in diesel oil (25 g/m³) or solutions of technical hexachlorocyclohexane (40 g/m³) were used as wet aerosol disinfectants. Standard charges of G-17 (1.2-1.4 g/m³) were used as dry aerosols. The dry aerosols are less toxic than the wet. The insects died after 3 days with wet aerosols and after 5 with dry."

9. Conference on Use of Hexachlorobutadiene, Hexachlorobutane, and Dinitrorodanbenzene on Colloidal Sulfur Against Plant Pests

"In the State Commission of Poisonous Chemicals, by A. M. Nikiforov; Moscow, Zashchita Rasteniy ot Vreditel'ey i Boleznay, No 12, 1962, p 56

"A conference, organized by the State Commission on Chemical Methods for Combating Plant Pests and Diseases and Weeds, was held in September to discuss the use of hexachlorobutadiene, hexachlorobutane, and dinitrorodanbenzene on colloidal sulfur. Seventy-seven production and science workers attended the meetings in Kishinev and Odessa.

"Ya. I. Prints, G. A. Kiryukhin, F. P. Polivtsev, S. P. Razumovskiy, M. A. Mirzonova, et al. reported on experimental use of hexachlorobutadiene and hexachlorobutane against the grape pest, phylloxera.

"The first preparation was recommended for agricultural use. The All-Union Scientific-Research Phylloxera Station was authorized to set up instructions on the use of hexachlorobutadiene under various soil and climatic conditions. The conference referred to the commission to speed up production of this material at the Ufimskiy plant.

"M. F. Zybov, A. A. Shymakova, P. M. Shterenberg, S. A. Alekseyeva, V. D. Knyasevskaya, et al. discussed test results of the use of dinitro-rodanbenzene on colloidal sulfur against apple scab, mildew, and grape fungus. The product was recommended as highly effective and to be used in regions where it does not provoke burns -- in Crimea and Odessa on grapes, in the Kabardino-Balkar Republic on fruit, and in Moldavia on tomatoes.

"The conference recommended further study of combinations of these preparations with insecticides. Combined with a concentrated emulsion of DDT, they cause serious burns. Also recommended for comparative study were three products on colloidal sulfur: dinitro-rodanbenzene, 'Tsineb,' and 'captan.'"

Medical Chemistry

10. Curare-Form Compounds Synthesized

"Synthesis Research on Curare-Form Alkaloids. Synthesis of 1-Ethylidene-12-oxy-1,2,3,4,5,6,12,13,13a,13b-decahydro-naphthiridino-(1,7)-[7,8,1-lma]-beta-carboline," by O. N. Tolkachev, L. I. Klimova, and Z. A. Olovyanishnikova, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; Moscow, Zhurnal Obshchey Khim 1, Vol 32, No 11, Nov 62, pp 3828-3832

The above-named compound was synthesized for the first time for the purpose of studying methods for the preparation of pentacyclic indole compounds containing the ethyleneidene group and the N₂ cycle. The synthesis consists of 11 steps starting with alpha-aceto-gammabutyrolactone.

11. New Cholinolytic Agents Synthesized

"Diethylaminoethyl Esters of Oxy- and Methoxybenzylic Acids," by S. G. Kuznetsov and I. N. Somin; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3783-3788

Many aminoalkyl esters of benzylic and other disubstituted glycolic acids are active cholinolytic agents. The presence of cyclic groups in the acid portion of these ester molecules is one of the most important factors which determine the nature and the degree of physiological activity of this type of compound. In the present work, diethylaminoethyl esters of oxy- and methoxy substituted benzylic acids containing one or two substituents in various positions on the benzene ring were synthesized. The diethylaminoethyl ester of o-oxybenzylic acid was obtained by transesterification of its methyl ester. Pharmacological investigation of the synthesized compound shows that introduction of hydroxyl and methoxyl groups in the benzene ring results in a decrease in cholinolytic activity, especially if the substituents are introduced at the ortho position. Most interesting was the ester of 3-oxybenzylic acid, which has a relatively high activity and low toxicity.

12. Atropine-Like Compounds Synthesized

"Optical Isomers of Some Cholinolytic Substances," by S. G. Kuznetsov and Z. I. Bobysheva; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3779-3783

Comparison of the physiological activities of optical antipodes of compounds having asymmetric structure serves as a means of studying the relationship of physiological activity to chemical structure. Having the same chemical and physical properties except for the direction of rotation of plane polarized light, these forms make it possible to rigorously appraise the effect of steric factors on the mechanism of physiological activity. In view of these considerations, optical isomers of 2-diethylaminoethyl esters of alpha-phenylcyclohexylacetic and alpha-phenylcyclohexylglycolic acids were synthesized. The racemic forms of these compounds are well known as active antagonists of acetylcholine which have an effect on the organism similar to that of atropine.

The isomers were prepared and separated by fractional crystallization of their salts with optically active bases.

Organophosphorus Compounds13. Derivatives of Aminophosphoric Acid Diethyleneamides Prepared

"Ethyleneamine Derivatives IV. Pyrimidyl-2-amino-phosphoric Acid Diethyleneimides," by A. A. Kropacheva, M. V. Sazonov, and S. I. Sergiyevskaya, All-Union Scientific Research Chemical-Pharmaceutical Institute imeni S. Orbzhonikidze; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3796-3799

Ten new diethyleneimides of substituted pyrimidyl-2-aminophosphoric acid were prepared by treating ethyleneimine with corresponding pyrimidyl-2-aminophosphoric acid chlorides. The products were all colorless crystal, soluble in water and alcohol but not in ether. The physical properties are presented in a table.

14. Reactions of Iminoesters With Phosphorus Pentachloride Studied

"Reactions of Iminoesters With Phosphorus Pentachloride," by G. I. Derkach, L. I. Samaray, and A. V. Kirsanov, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3761-3764

It was previously shown that phosphorus pentachloride reacts with alkyl esters of iminocarboxylic acid to form trichlorophosphazoacyl compounds. Further study shows that in the reaction of phosphorus pentachloride with free iminoesters, addition products are formed which subsequently decompose to form phosphazo compounds, alkyl halides, and hydrogen chloride. On reaction with glacial acetic acid, the addition products form hydrogen chloride salts of iminoesters, acetyl chloride, and phosphorus oxychloride. Carboxylic acid amides, alkyl halides, hydrogen chloride, and phosphoric acid are formed on hydrolysis.

15. New Method for Synthesizing Alkyl Esters of Phosphazocarboxylic Acids

"Alkyl Esters of Phosphazocarboxylic Acids," by G. I. Derkach, L. I. Samaray, A. S. Shetepanek, and A. V. Kirsanov, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3759-3761

A study shows that dialkyl esters of N-chloroiminocarboxylic acids react with triphenylphosphines, arylchlorophosphines, and aroxychlorophosphites to form alkyl esters of triphenyl-, arylchloro-, and aroxychlorophosphazocarboxylic acids. The reaction is general in nature and permits synthesizing the most diverse derivatives of alkyl esters of phosphazocarboxylic acids having various substituents on the phosphorus atom, including those which are difficult or impossible to obtain by previously described methods.

16. Phosphorylation of Aromatic Acid Amides Studied

"Phosphorylation of Aminoarenesulfonic Acid Amides," L. P. Zhuravleva and A. V. Kirsanov, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3752-3759

A study shows that phosphorus pentachloride reacts with aminobenzenesulfamides and with aminobenzenesulfonic acid dimethylamides to form trichlorophosphazosulfonyl-trichlorophosphazophenylenes and trichlorophosphazo-dimethylamidossulfonylphenyls. The meta and para isomers of the latter compound are dimers and the ortho isomers are monomers. Hydrolysis of o-triphosphazosulfonyl-trichlorophosphazophenylene and o-trichlorophosphazo-dimethylamidossulfonylbenzene results in the formation of corresponding dichloro- and dioxyphosphonyl derivatives. Methyl alcohol or sodium phenolate reacts with trichlorophosphazosulfonyl-trichlorophosphazophenylenes and trichlorophosphazo-dimethylamidossulfonylphenyls to form N, N'-disdimethoxy)phosphonylaminobenzenesulfamides and N-dimethoxy(diphenoxy)phosphonylaminobenzenesulfoxy acid dimethylamides.

17. Transesterification of Diphenylphosphite Studied

"Synthesis and Transesterification of Diphenylphosphite,"
by K. A. Petrov, E. Ye. Nifant'yev, R. G. Gol'tsova,
A. A. Shchegolev, and V. V. Bushtin; Moscow, Zhurnal
Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3723-3727

It is well known that diethylphosphite and other simple phosphites and phosphonites are transesterified with alcohols at 160-170°C in the presence of catalysts to form higher dialkylphosphites. Despite the many advantages of this method, it gives poor results in some cases owing to the high temperature of the reaction. A study was, therefore, made of the reaction of diphenylphosphite with aliphatic alcohols. Experiments show that this reaction takes place vigorously at 100°C. This serves as the basis for a new method of synthesis of diarylphosphites.

18. Phosphorylation of Polyhydric Alcohols Studied

"Phosphorylation of Glycerin and Its Derivatives by Alcoholysis of Dialkylphosphonous Acid Amides. New Methods for Directing Substitution of Hydroxyl for Cyano Groups,"
by K. A. Petrov, E. Ye. Nifant'yev, and L. V. Kharkhoyanu;
Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62,
pp 3720-3723

A study was made of the phosphorylation of glycerin and its derivatives by alcoholysis of amidophosphites. Dipropylphosphonic acid diethylamide served as the phosphorylating agent. A method is proposed for directing the substitution of hydroxyl groups for cyanogen groups by splitting the dialkylphosphonites with alkyl cyanides. Cyanodesoxy-1, 2-isopropylidineglycerin was synthesized and its chemical properties studied.

19. Transesterification of Phosphites and Phosphonites Studies

"Transesterification of Phosphites and Phosphonites With Substituted Alcohols," by K. A. Petrov, E. Ya. Nifant'yev, and R. G. Gol'tsova; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3716-3720

A study was made of the transesterification of ethyl esters of phosphorous, methyl-, phenyl-, and dipropylphosphonous acids with substituted alcohols, and a number of phosphites and phosphonites were synthesized. Transesterification reactions were also conducted with beta-chloro- and beta-fluoroethyl esters of phosphorous acid and substituted alcohols. The relative ease of alcoholysis of the esters depends on the electrophilicity of ester groups of the phosphites and phosphonites. A previously described mechanism of the transesterification of esters of trivalent phosphorus was confirmed.

20. Phosphorocholines and Acetylphosphorocholines Prepared

"Phosphorus Analogs of Choline and Acetylcholine I. Phosphorocholines and Acetylphosphorocholines," by K. A. Petrov, A. I. Gavrilova, V. M. Nam, and V. P. Chuchkanova; Moscow, Zhurnal Obshchey Khimii, Vol 32, No 11, Nov 62, pp 3711-3716

At the present time, only a few phosphorus analogs of choline and acetylcholine are known. Pharmacological investigation of these compounds shows that they promote the same activity as choline and acetylcholine but are somewhat less active. For this reason, apparently, these compounds have not been well studied.

Phosphorocholines and acetylphosphorocholine are structurally similar to choline and acetylcholine and, therefore, manifest different activity, depending on the alkyl groups and the number of methylene groups connecting the phosphorus to hydroxyl groups or acetate groups. Acetylphosphorocholine, having two reactive sites similar to that of acetylcholine, will possibly replace the latter during transfer of nerve impulses, thus acting as a labile intermediary in conjunction with cholinesterase. These substances seem to be cholinesterase inhibitors having insecticidal activity.

Phosphorocholine was obtained by condensation of triethylphosphine with formaldehyde in the presence of hydrochloric acid. Acetylphosphorocholines were obtained by reaction of tertiary phosphines with alkyl-halogenoesters of acetic acid. Acetylphosphorocholines were also prepared

C-O-N-F-I-D-E-N-T-I-A-L

by reaction of phosphorcholines with acetyl chloride or acetyl bromide. Both phosphorcholines and acetylphosphorcholines form salts with hydrochloric acid, chloric acid, and chloroplatanic acid.

21. New Method for Preparation of Sulfur- and Nitrogen-Containing Organophosphorous Compounds

"Reaction of N,N-dialkylaminosulfene Chlorides With Trialkyl Phosphites. New Method for Preparation of Dialkyl-S-dialkylaminothiophosphates," by Ya. N. Mikhal'ski and Bozhena Plishka, Polytechnic Institute of Lodz, Poland; Moscow, Doklady Akademii Nauk SSSR, Vol 147, No 1, 1 Nov 62, pp 111-112

While studying the chemical properties of dialkyl-S-dialkylaminothiophosphates, it was discovered that these compounds do not react with trialkyl phosphites under ordinary conditions. It was, therefore, assumed that an Arbuzov type reaction may be utilized to synthesize these compounds. The readily available N,N-dialkylaminosulfene chlorides serve as the electrophilic reagent. It was found that the chlorides react with the trialkyl phosphites spontaneously. Three derivatives were prepared.

Plastics

22. K. Andrianov Discusses Use of Organosilicon Polymers

"Organosilicon Polymers -- Heat Resistant," by K. Andrianov, Corresponding Member of the Academy of Sciences USSR; Moscow, Pravda, 14 Nov 62, p 3

In discussing the uses of organosilicon polymers, Corresponding Member of the Academy of Sciences K. Andrianov notes the special importance of ethyl silicate films in making metal castings for machines. These castings are so accurate that they need no reworking. This method saves 2 tons of rolled metal for each ton of castings made and simplifies production. Seventy kilograms of ethyl silicate are used for each ton of castings.

Use of heat-resistant organosilicon electric insulators has allowed a reduction in size and an increase in the life of machines.

Liquid organosilicon polymers are used to make heat- and cold-resistant lubricants and oils and water-resistant materials. These liquids are also used in food production machines, eliminating, for example, the necessity of adding flour to bread while baking.

23. Latvian Chemists Make Plastic From Green Wood

"Wood Instead of Bronze"; Moscow, Sovetskaya Rossiya, 31 Oct 62, p 4

"The Institute of Forestry Problems and Wood Chemistry of the Latvian Academy of Sciences has developed a process for making plastic from green wood containing up to 80-90% water. The fiction coefficient of this plastic is 1 1/2 times lower than that of bronze and steel alloys, and the cost is ten times lower. The plastic made from 0.5 cubic meter of birchwood can replace one ton of bronze."

Radiation Chemistry24. Isotopes of Xe and Kr From Uranium Target Bombardment

"Study of Yields of Xe and Kr Isotopes Formed by Irradiating Uranium With 680 Mev Protons," by A. N. Dobronravova, L. K. Levskiy, A. N. Murin, and N. Ye. Titov, Laboratory of Pre-Cambrian Geology, Academy of Sciences USSR, and Radiation Institute imeni V. G. Khlopin, Academy of Sciences USSR; Moscow, Geokhimiya, No 6, 1962, pp 540-542

A study of the relative yield of isotopes of xenon and krypton formed by uranium fission with high energy (680 Mev) protons was conducted. Two uranium targets were bombarded in the synchrocyclotron at the Joint Institute of Nuclear Research in Dubna and cooled for 50 days and one year, respectively. Results of the relative output of the isotopes in question are given and compared to results obtained from thermal neutron bombardment and the amount of Xe isotopes in the earth's atmosphere.

25. Gamma-Radiation of Several Neutron-Deficient Terbium Isotopes

"Radioactive Emanations and Methods of Studying Them," by V. N. Belogurov, O. E. Veveris, Z. E. Pelekis, and L. L. Pelekis; Riga, AN, LatvSSR (Academy of Sciences Latvian SSR), 1961, pp 49-59 (from Referativnyy Zhurnal -- Khimiya, No 20, 1962, Abstract No 20B237, by Ye. Tikhomirova)

"A Tb target was bombarded by protons with an energy of 660 Mev for 4 hours and for 40 minutes. Tb was separated chromatographically 30 hours after radiation in the first case and after 5 hours in the second case. Gamma-spectra were studied on a coincident scintillating spectrometer consisting of two spectrometers with NaI (Tl) crystals; the resolving

time on the graph coincides with 5×10^{-7} seconds. The field of energy studied was from 30 to 400 kev. In the first case, Tb^{153} , Tb^{155} , and Tb^{156} were discovered in the Tb fraction. Tb^{157} was not found. The presence of Tb^{151} , Tb^{152} , and Tb^{154} was assumed. In the second case, according to previous facts, the preparation contains Tb^{153} , Tb^{155} , and Tb^{156} ."

26. Effect of Ionizing Radiation on Anion Exchange Resins Studied

"Study of Radiation Stability of Ion Exchange Resins III. Action of Ionizing Radiation of an Accelerated Electron Flux on Anion Exchange Resins," by Ye. B. Kisleva, K. V. Chmutov, and M. V. Filatova, Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 11, Nov 62, pp 2465-2468

A study was made of the effect of the ionizing radiation of an accelerated electron flux on the physical chemical and ion exchange properties of the anion exchange resins AV-17, AM, AMP, and VP-1. It was shown that irradiation of AV-17 and AM with a dose of $0.1-1.4 \times 10^{23}$ electron volts per gram causes a decrease in weight, exchange capacity, and degree of swelling. Potentiometric titration shows that the basicity of irradiated AV-17 decreases, although the anion exchanger remains polyfunctional. Anion exchange resins having a pyridine exchange group resist ionizing radiation of an accelerated electron flux.

27. Effect of Radiation on Ion Exchange Resins Studied

"A Study of the Radiation Stability of Ion Exchange Resins," by Ye. D. Kiseleva, K. V. Chmutov, and V. M. Krupnova, Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 11, Nov 62, pp 2457-2464

A study was made of the effect of ionizing radiation on phenol-formaldehyde cation exchange resins KU-1 and RF and polymerized polystyrene resins KM-1 and SBS-2. The radiation effect depends on the structure of the macromolecular network, the chemical nature of the exchange group, type of cross-linkage, and the radiation medium. Both in divinylbenzene-styrene copolymers and in phenol-formaldehyde resins, the C-R bond is more resistant to ionizing radiation than the C-S bond. By changing the structure of the cross-linking component, it is possible to change the radiation stability of the ion exchange resin. Replacement of divinylbenzene with butadiene results in stabilization of the C-S bond. This bond is more stable to ionizing radiation in phenol-formaldehyde resins than in sulfonated styrene-divinylbenzene copolymer.

Rare Metals28. Solubility of Rare-Earth Complexes

"Complex Amino-Cations of Rare-Earth Elements," by R. A. Chupakhina and V. V. Serebrennikov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 12, Dec 62, pp 2699-2701

Complex compounds of the trivalent rare-earth elements with nicotinic acid and chromium hexacyanate were synthesized and their solubility in water at room temperature was studied. These compounds which have a general composition $[M(\text{nicot})_3][\text{Cr}(\text{CNS})_6]$, where M is the rare-earth element, were found to be highly soluble in aqueous solution.

29. Solubility of Uranyl and Uranium Oxalates in Water

"Composite Uranyl and Uranium Ammonio-Sodium Oxalates," by N. N. Yelovskikh and K. T. Rumyantseva; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2639-2640

Ammonio-sodium uranyl oxalate $(\text{NH}_4)_2\text{Na}_2[\text{UO}_2(\text{C}_2\text{O}_4)_3]$ and ammonio-sodium uranium oxalate $(\text{NH}_4)_2\text{Na}_2[\text{U}(\text{C}_2\text{O}_4)_4]$ were formed by treating the oxalates of ammonium and sodium with uranium. The solubility of these complexes in water was determined with respect to uranium, from which it was found that UO_2^{+2} readily forms carbonates and oxalates, while U^{+4} forms only the composite uranium oxalate shown above which is more soluble in water.

30. Separation of SnCl_2 From Rare-Earth Metal Chlorides

"Reaction of Stannous Chloride With Iron, Sodium, and Rare-Earth Metal Chlorides," by Li Chi-Fa and I. S. Morozov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 12, Dec 62, pp 2765-2770

The reactions of cerium, lanthanum, iron, and tin chlorides during crystallization were studied. Binary and ternary phase diagrams were constructed for the various metal chlorides from which it was noted that vapors condensed from the $\text{SnCl}_2\text{-La (Ce) Cl}_3$ system contained only SnCl_2 , thereby rendering a possible method of separating stannous chloride from rare-earth metal chlorides.

31. Detecting Trace Amounts of Gallium

"Fluorometric Determination of Trace Quantities of Gallium in Semiconductor Silicon and Zinc of High Purity," by V. A. Nazarenko, S. Ya. Vinkovetskaya, and R. V. Ravitskaya, Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR, Odessa Laboratory; Kiev, Ukrainskiy Khimicheskiy Zhurnal, Vol 28, No 6, 1962, pp 726-728

The use of fluorometry with sulfonaphtholazoresorcin for determining microquantities of gallium in elemental silicon, SiO_2 , SiCl_4 , and metallic zinc is described. Silicon and its compounds and zinc were prepared by grinding into coarse powders and/or dissolving in acids. The gallium ions were isolated by ion exchange or extracted with ether from the acid solution. Trace amounts of gallium amounting to 1×10^{-6} - $2 \times 10^{-7}\%$ were determined.

32. Reduction of Uranium Trioxide

"Effect of Alkali Metal Carbonates on the Reduction Rate of Uranium Trioxide," by V. M. Zhukovskiy and V. G. Vlasov, Urals Polytechnic Institute imeni S. M. Kirov; Leningrad, Zhurnal Prikladnoy Khimii, Vol 35, No.10, Oct 62, pp 2131-2134

The effect of alkali metal carbonates (Li_2CO_3 , Na_2CO_3 , K_2CO_3) on the reduction of UO_3 with decomposed ammonia ($3\text{N}_2 + \text{H}_2$) was studied. It was found that a given amount of carbonate retards the reduction process. This phenomenon is explained by the formation of a layer of uranates on the surface of the UO_3 which shields it and allows the adsorption of water vapor to increase. These two factors overshadow a third factor -- increased free electron concentration, with the over-all reduction rate being reduced.

33. Redox Studies of the Uranium (IV) - Uranium (III) System

"A Study of the U^{+4} - U^{+3} System," by I. P. Alimarin, Ye. R. Nikolayeva, and V. M. Masalovich; Moscow, Vestnik Moskovskogo Universiteta -- Khimiya, No 5, Sep/Oct 62, pp 50-54

Conditions for electrolytic reduction of uranyl salts with a mercury, platinum, or tungsten cathode in sulfuric, hydrochloric, and perchloric acids were studied for determining uranium in the trivalent form and subsequent development of a method of analysis for uranium materials.

In addition to a study of the effects of temperature, acid concentration, and electrolysis time, the redox potentials of the system were examined in relaxation to acid concentration.

A tungsten cathode was found to be best suited for this system since other cathodes do not readily reduce U^{+4} to the U^{+3} ion. Ammonium vanadate was accepted as the best titrating solution for determining U^{+3} content.

34. Use of Salting-Out Agents in the Extraction of Germanium

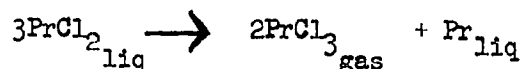
"Effect of Salting-Out Agents in the Process of Extracting Germanium From Hydrochloric Acid Solutions," by T. Artykbayev and G. A. Tsyganov, Institute of Chemistry, Academy of Sciences Uzbek SSR; Tashkent, Uzbekskiy Zhurnal, No 4, 1962, pp 38-48

A discussion is presented on the use of $MgCl_2$ and $CaCl_2$ as salting-out agents for extracting small quantities of germanium in the form of germanium tetrachloride and hexachlorogermanic acid from hydrochloric acid solutions with various organic solvents. Results of experiments indicated that $CaCl_2$ is most effective in low acid concentration (0.5-3N) and $MgCl_2$ at higher concentrations (5-7N). Without the use of salting-out agents, the extraction process does not begin until the acid concentration is 7-8N or greater.

35. Determining the Heat of Formation of $PrCl_2$ From the $PrCl_3$ -Pr System

"A Study of the $PrCl_3$ - Pr System," by G. I. Novikov and O. G. Polyachenok, Chemistry Faculty, Leningrad State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 5, May 62, pp 1209-1210

Heat of formation (ΔH_f°) of $PrCl_2$ was determined by two methods. First, an isothermal diagram was constructed for the $PrCl_3$ -Pr system at 1,180°C. Taking data from the isotherm and using the known value for ΔH_f° ($PrCl_3$) of -258 kcal/mole, from the equation for the decomposition of $PrCl_2$



ΔH_f° ($PrCl_2$) was approximated to be -173 kcal/mole. Second, data were taken from the fusibility diagram of the system, and ΔH_f° ($PrCl_2$) was calculated to be -174 kcal/mole.

36. Vapor Pressure Studies of ReOCl_4

"Pressure and Composition of Rhenium Monoxytetrachloride Vapor,"
by M. V. Baryshnikov, A. N. Zelikman, and M. V. Teslitskaya; Moscow,
Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2634-2635

Vaporization of ReOCl_4 was studied to obtain data on the composition of ReOCl_4 and the boiling point at various pressures and to determine an empirical formula for calculating the vapor pressure at a given temperature.

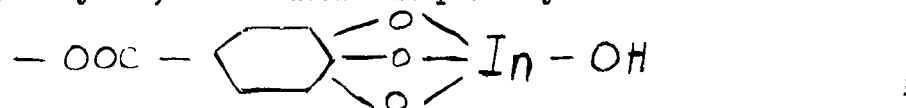
From the experimental data, ReOCl_4 was calculated to have a latent heat of vaporization = 10.9 kcal/mole and a b. p. of 228°C at atmospheric pressure. It was also established that ReOCl_4 vapor does not polymerize.

37. Structure of Indium Gallate Complex

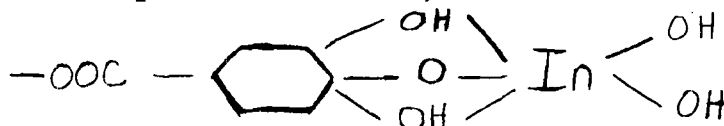
"Complex Formation of Indium With Gallic Acid," by D. N. Ryabchikov, Yao Ke-Min', and I. I. Marov, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2545-2548

The composition of properties of complex indium compounds formed by reaction with gallic acid was studied by ion-exchange and titration methods.

It was found that in neutral solution, indium reacts with gallic acid to form a substantially stable indium gallate complex with two possible structures. If there are no configurational obstructions for closing the two 5-member cycles, the structure is probably



and if there are spatial obstructions, then a second structure is possible, i.e.,



Both structures have a -2 charge and are adsorbed by the anion resin.

38. Niobium Oxalates of Alkali Metals and Ammonia

"Concerning the Structure of Complex Niobium Oxalates," by L. G. Vlasov, A. V. Lapitskiy, M. A. Salimov, and B. V. Strizhkov; Moscow, Zurnal Neorganicheskoy Khimii, Vol. 7, No 11, Nov 62, pp 2534-2536

The thermal decomposition of synthesized niobium oxalates of alkali metals and ammonia was studied to obtain some information of the bonding, type, and energy and some knowledge of the chemical structure involved. From spectrum analysis, it was proposed that the general chemical formula of the oxalate complex was $\text{Me}_3[\text{Nb}(\text{OH})_2(\text{C}_2\text{O}_4)_3] \cdot n \cdot \text{H}_2\text{O}$, which can be more specifically written as: $\text{Me}[\text{NbO}_2(\text{C}_2\text{O}_4)] : 2\text{MeHC}_2\text{O}_4 \cdot \text{H}_2\text{O}$, where Me represents the alkali-metal or ammonium ion.

39. Distribution of Ti, Ta, and Nb in Upper Sayan Sphene-Containing Granitoids

"Distribution of Titanium, Niobium, and Tantalum in Sphene-Containing Granitoids," by Ye. D. Znamenskiy, V. V. Konusova, I. A. Krinberg, E. I. Poplitov, K. V. Flerova, and V. D. Tsykhanskiy, Institute of Geochemistry, Siberian Branch, Academy of Sciences USSR; Moscow, Geokhimiya, No 9, 1962, pp 800-805

On the basis of studying the Ti, Nb, and Ta distribution in sphene-containing granitoids, it was found that biotites of this type contain 31-70% TiO_2 , 16-60% Nb, and up to 38% Ta. Sphenes of these granitoids, which are found in the Upper Sayan Range, contain 21-42% TiO_2 , 35-85% Nb, and 60% or more Ta.

The high ratio of Ti:Nb (200:1) and Ta:Ti (2000:1) in unaltered granitoids of two types (Ilmenite-rutile granites and sphene granitoids) was noted, but no conditions favoring the formation of accessory tantaloniobates were found to exist.

40. Distribution of Uranium and Thorium in Alkaline Rocks

"Uranium and Thorium in Alkaline Rocks of the Urals," by Ye. M. Yes'kova, D. A. Mineyev, and I. G. Mineyeva, Institute of Mineralogy, Geochemistry, and Crystal Chemistry of Rare Elements, Academy of Sciences USSR; Moscow, Geokhimiya, No 9, 1962, pp 770-777

Uranium and thorium distribution in various types of alkaline rock of the Urals and South Mugodzhazhar Region was studied. For the most part, the thorium content was near to the average thorium content in the earth's crust, but the uranium content is high in comparison to the earth's

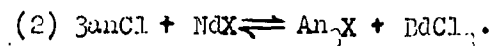
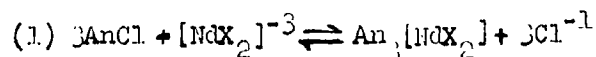
crust. Variations in the Th/U ratio are directly associated with the change in the uranium content. A direct correlation of the contents of radioactive elements with rare earths and to a smaller degree with Nb and Zr was established.

41. Adsorption of Neodymium Nitrilotriacetates

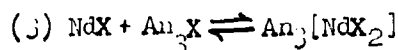
"Concerning the Composition of Complex Compounds Formed by Rare-Earth Elements With Nitrilotriacetic Acid in the Process of Ion-Exchange Chromatography," by N. D. Mitrofanova and L. I. Martynenko, Chair of Inorganic Chemistry, Moscow State University imeni M. D. Lomonosov; Moscow, Zhurnal neorganicheskoy Khimii, Vol 7, No 5, May 62, pp 1049-1053

Neodymium was treated with MTK (nitrilotriacetic acid) to study the formation of complex compounds. Only two complexes were observed: Monocomplex NdX and dicomplex $(NdX_2)^{-3}$.

When passing the dicomplex solution through anion resin, the dicomplex is fully adsorbed, whereas the monocomplex breaks down. The following reactions, where An^+ is the anion radical, shows the processes involved:



Due to the reversibility of the reactions, a second reaction occurs in reaction 2, as shown in reaction 3,



Whereby approximately 50% of the neodymium in the initial noncomplex solution is adsorbed as a dicomplex.

42. Thermal Decomposition of Y, Sc, and La Oxalates

"Thermal Decomposition of Yttrium, Scandium, and Lanthanum Oxalates," by Ya. S. Savitskaya, N. N. Tvorogov, S. V. Kalabukhova, and L. S. Brykina; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 9, Sep 62, pp 2029-2033

Thermal analyses showed that scandium and yttrium oxalates decompose in two stages, i.e., removal of water of hydration and subsequent liberation of CO and CO₂ gases. Lanthanum oxalate decomposes in three steps, i.e., removal of water of hydration, liberation of CO and CO₂ gases yielding La₂O₃ (CO₂), and liberation of remaining CO₂ gas. All reactions occur at increased temperatures for the subsequent stages exothermal.

Yttrium oxalate was found to decompose in an inert media of helium gas by endothermal reaction.

43. Stability of Thallium and Indium Halides

"Stability of Thallium and Indium Composite Halides in Solutions," by Ya. D. Fridman, R. I. Sorochan, and N. V. Dolgashova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 9, Sep 62, pp 2127-2133

Thallium and indium halides were studied with respect to their stability as singular or composite compounds. The solubility of thallium and indium iodo-bromides and chloro-bromides in solution at 25°C was determined.

Stability of singular halide compounds conforms to the usual sequence where chlorides are most stable, and iodides, least stable. Composite halides do not conform to the same pattern.

Thallium bromo-iodo complexes were found to be more stable than thallium bromo-chloro complexes, while no indium bromo-iodo complexes were formed owing to the low stability of the complex. No explanation was given for this peculiarity.

In general, indium halides are less stable than their thallium counterparts. This distinction was believed to be due to the tendency to thallium to form covalent bonds more easily with the halide elements.

Semiconductors

44. Semiconductor Method Used To Reproduce Colored Photographs

"Luminescent Photography," by I. Kirpichnikova; Leningrad, Lenin-gradskaya Pravda, 7 Dec 62, p 4

"A new method of luminescent color photo-reproduction was developed at the branch imeni M. A. Bronch-Bruyevich of the Leningrad Electro-technical Institute by instructor V. V. Odnol'ko, senior chief engineer A. S. Fomin, and L. V. Gavrilov, with the help of members of the student scientific-technical society. The images are produced by commercial colored luminophors in the form of powders.

"Three separate metal plates are covered with a selenium semiconductor layer and are positively charged. Then a monotone image of the photo being developed is projected on each plate with a photo-enlarger; red on the first, blue on the second, and green on the third.

"The electric charge on the selenium layer is dispersed and an invisible electrostatic image of the original photograph results. To see it, the plates must be immersed in water containing a suspension of negatively charged luminophor particles -- red for the first plate, blue for the second, and green for the third. These particles adhere to the electrostatic image.

"This is the 'liquid' method. The 'dry' method, equally simple, involves dusting the positively charged luminophor particles on each plate.

"The developed photo can be seen under an ultraviolet light.

"All three layers of the luminescent-powdered image can be transferred to one transparent plate covered with a previously moistened gelatinous layer. The process is similar to that of the familiar children's 'Decals.'

"Under the direction of Prof P. B. Shmakov, acting director of science and technology at this institute, this method is being developed for future use in color television."

45. Bismuth and Arsenic Telluride Semiconductors

"Reaction of Bismuth and Arsenic Tellurides," by the Ye. I. Yurembash and Ye. S. Vigileva, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 12, Dec 62, pp 2756-2759

Study of the Bi_2Te_3 - As_2Te_3 system was necessitated by the extensive use of bismuth telluride in the production of thermal batteries. Alloys of this system were studied with respect to their electric and thermoelectric properties as multiphase semiconductors and in relation to future uses.

Phase diagram studies and physical measurements showed that these particular tellurides constitute a "degenerative-eutectic" type system. No compounds were formed, and only two phases were found to be present in all of the alloys checked with a mutual solubility of less than 0.5%. The two components of the system (Bi_2Te_3 and As_2Te_3) are p-type conductors, while their alloys are n-type.

Values of the thermal emf and specific electric conductivity for the telluride alloys were determined.

46. Phase Studies of Bismuth and Arsenic Selenides

"Reaction of Bismuth and Arsenic Selenides," by Ye. I. Yarembash and Ye. S. Vigileva, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, Dec 62, pp 2752-2755

Phase equilibria and physical properties of the Bi_2Se_3 - As_2Se_3 quasi-binary system were investigated. Solubility of the compounds in the solid state was less than 1%, and no chemical compounds were formed.

Microstructure studies showed that cast alloys containing more than 1% As_2Se_3 consist of two phases -- a crystalline Bi_2Se_3 and an amorphous As_2Se_3 . Alloys with 90% As_2Se_3 or more were observed to contain an accumulation of spiral-shaped polycrystals of Bi_2Se_3 resulting from the alteration of spherulite. Alloys subjected to extended treatments at 230°C for 2100 hours and 75 days showed no transformations and still consisted of two phases.

Miscellaneous47. Academician V. Kargin Discusses the Field of Synthetic Chemistry

"The Great Future of Chemistry," by Academician V. Kargin; Moscow, Pravda, 14 Nov 62, p 3

Academician V. Kargin gives his views on the future of chemistry in Russia. Of special importance are the expanding fields of high polymer chemistry and of new synthetic materials. Since these materials can, in many instances, replace metals, it would be worthwhile to reconsider the relative amounts of capital to be invested in metals and in development of new synthetic materials. Kargin also urges an effort toward increased efficiency in the production of these materials and toward increased automation. To maintain an advanced position in the field of synthetic chemistry, the government must place greater emphasis on research and development and on the training of scientists in this field.

Kargin notes several weaknesses in the development of polymer chemistry in the Soviet Union. New discoveries are too slowly put into general use. Equipment is inclined to be old-fashioned. Production of reagents and special chemicals needed for new materials is insufficient. Too little research is being done by the industries themselves, and scientific research in general is poorly coordinated.

48. Rate of Combustion of Powder Mixture Studied Mathematically

"Speed of Combustion of a Model Powder Mixture in the Diffuse Zone," by B. V. Novozhilov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Fizicheskoy Khimii, Vol 36, No 11, Nov 62, pp 2508-2511

Mathematical analysis shows that the rate of combustion of a model powder mixture consisting of components with similar thermophysical properties in the diffuse zone is independent of pressure and inversely proportional to the dispersion of particles.

49. Bromine-Iodine Coefficient Used To Determine Presence of Oil in Water

"A Helper for Prospectors of Mineral Resources," by B. Nosov, correspondent for the Uzbekistan Telegraph Agency; Tashkent, Pravda Vostoka, 30 Oct 62, p 4

A new method -- the bromine-iodine coefficient -- for determining the presence of oil under water was worked out by B. A. Beder. Since oil and iodine are of the same organic origin, the presence of iodine indicates the presence of oil. Bromine is mineral in origin. According to Beder, when the ratio of bromine to iodine is less than 70:30, there is certainly oil in the area.

50. Synthetic Rubber Institute Develops Two New Synthetic Rubbers

"Synthetic Rubbers -- Tires of High Quality," by Dolgoplosk, Corresponding Member of the Academy of Sciences USSR; Moscow, Pravda, 14 Nov 62, p 3

The personnel of the All-Union Scientific-Research Institute of Synthetic Rubber imeni S. V. Lebedev has developed a new synthetic rubber, "SDI," which is very similar to natural rubber and which will shortly go into production.

The personnel in cooperation with the Yaroslav and Yefremovskiy synthetic rubber factories, also developed a new process for making 1,3-butadiene rubber, "SDK." The process involves a special catalytic system which ensures that each link in the polymer chain will be of the same form. This new rubber is as flexible as natural rubber and more durable.

The production processes of both rubbers are complex, requiring the use of minute quantities of many different substances.

51. V. A. Popov and E. P. Zimin Develop High-Conductivity Plasma

"Current From Plasma"; Moscow, Komsomol'skaya Pravda, 27 Oct 62, p 4

"Co-workers of the Power-Engineering Institute of the Academy of Sciences USSR imeni G. M. Krizhizhanovskiy, V. A. Popov and E. P. Zimin, were able to make plasma with very high conductivity by adding alkali metals to inert gases. They also determined the optimum amounts of metal to be added to each gas and showed that the size of the necessary dose of metal is dependent on the pressure of the gas."

52. Rubber, Linoleum, Hylon, Sponge Made To Conduct Electricity

"Current Goes Through Rubber," by Yul. Medvedev; Moscow, Vechernaya Moskva, 22 Oct 62, p 2

A method was devised by research workers at the All-Union Scientific-Research Institute of Film Materials and Artificial Leather for making rubber, linoleum sponge, and nylon which conduct electricity. These products can be used to heat floors, walls, and even boots (by use of batteries in the heels.)

53. Absorption of Ultrasound in Solutions

"Measurement of the Absorption of Ultrasound in Solutions in the Presence of an External Electric Field," by V. P. Akhaladze and B. B. Kudryatsev, Sb. Primeneniye Ul'traakust. k Issled. Veshchestva (Collection of Articles on the Application of Ultrasonics to the Study of Matter), Moscow, No 12, 1962, pp 177-187 (from Referativnyy Zhurnal -- Khimiya, No 21, 10 Nov 62, Abstract No 21B374, by D. L. Azeyeva)

"The velocity and absorption of sound in the 8,000 to 19,000 cps range in binary mixtures of benzene-nitrobenzene and n-heptane-nitrotoluene at 21°C under the influence of an electric field (500-1,000 v/cm) were measured. No effect of the electric field on the absorption of ultrasound was observed."

Conferences54. Fourth Conference on High Speed Photography in Novosibirsk

"Third Conference on High Speed Photography and Cinematography," by V. G. Pell'; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 7, No 6, Nov/Dec 62, pp 474-476

The Third Conference on High Speed Photography and Cinematography, organized by the Commission on Scientific Photography and Cinematography of the Department of Chemical Sciences of the Academy of Sciences USSR, the Leningrad Institute of Motion Picture Engineers, and the State Optics Institute imeni S. I. Vavilov, was held in Leningrad on 4-7 July 1962. More than 400 persons from various cities of the Soviet Union took part in the conference (non-Soviet participation is not indicated). It was recommended that the Commission on Scientific Photography and Cinematography call the Fourth Conference in Novosibirsk under the Siberian Department of the Academy of Sciences USSR.

[Comment: The first conference on this subject was held in November 1957 in Leningrad, and the second, in May 1960 in Moscow.]

55. Recent Soviet Conferences in Chemistry and Metallurgy

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. It is assumed that there was no non-Soviet participation in the conferences.

a. Fifth All-Union Conference on Colloidal Chemistry; 31 May-6 June 1962, Odessa. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 136)

b. Conference of Young Specialists on Results of Work in the Field of Automation of Production Processes in the Chemical and Nonferrous Metallurgy Industries; no date given, Kirovakan; sponsored by the Komsomol Organization and the Kirovakan Scientific-Research Institute for Automation of Production Processes in the Chemical Industry. (Kommunist, 27 Nov 62, p 2)

c. All-Union Conference on Theoretical Problems of Corrosion and Protection of Metals; 3-5 October 1961, Moscow; sponsored by the Commission for Control of Corrosion of Metals under the Department of Chemical Sciences of the Academy of Sciences USSR. (Izvestiya Vysshikh Uchebnykh Zavedeniy -- Neft' i Gaz, No 12, 1961, p 54)

d. All-Union Conference on Build-Up Welding; 11-14 June 1962, Chelyabinsk; sponsored by the State Committee of the Council of Ministers RSFSR for Coordination of Scientific Research Work, the Institute of Electric Welding imeni Ye. O. Paton, the Chelyabinsk Sovnarkhoz, and the Chelyabinsk Oblast Board of the Scientific-Technical Society of the Machine Building Industry. (Svarochnoye Proizvodstvo, No 12, Dec 62, p 43)

e. All-Union Conference on Strengthening of Machine Parts; 23-26 May 1962; sponsored by the State Committee of the Council of Ministers USSR on Automation and Machine Building, the Institute of Machine Studies, and the State Committee of the Council of Ministers USSR for Coordination of Scientific Research Work. (Svarochnoye Proizvodstvo, No 12, Dec 62, p 44)

f. Fifth Lithuanian Republic Conference on Welding; 13-15 August 1962, Klyaped; sponsored by the Lithuanian Republic Institute of Scientific-Technical Information and Propaganda, the Machine Building and Instrument Building Administrations of the Lithuanian Sovnarkhoz, the Baltiyskiy Shipbuilding Plant, and the Central Production-Research Welding Laboratory of the Lithuanian Sovnarkhoz. (Svarochnoye Proizvodstvo, No 12, Dec 62, p 45)

g. Conference on Problems of Cold Shortness of Steel and Resistance of Welded Structures to Brittleness; 11-14 December 1962, Leningrad; sponsored by the Leningrad Physicotechnic Institute imeni A. F. Ioffe of the Academy of Sciences USSR. (Leningradskaya Pravda, 12 Dec 62, p 4)

h. Seminar on Solid Alloys and Their Application in Industry; November 1962 (2 days), Tbilisi; sponsored by the All-Union Scientific Research Institute of Solid Alloys. (Zarya Vostoka, 1 Dec 62, p 2)

56. Forthcoming Conference on Physics of a Welding Arc

"Conference on Problems of the Physics of a Welding Arc,"
by S. L. Uspenskiy; Moscow, Svarochnoye Proizvodstvo,
No 11 (311), Nov 62, pp 43-44

The Institute of Metallurgy imeni Baykov and the National Committee of the USSR on Welding under the Academy of Sciences USSR conducted a Conference on Problems of the Physics of a Welding Arc on 29-30 May 1962. Chairman of the conference was N. N. Rykalin. It was decided that the next conference on this subject should be held in 1964.

II. METALLURGY

Continuous Casting off Steel57. Continuous Casting of 130-mm-Square Billets

"At the Ukrainian Scientific Research Institute of Metals -- Continuous Casting of 130-Mm-Square Billets," by V. I. Dorokhov; Moscow, Stal', No 12, Dec 62, p 1136

"The basic parameters were established for a technology for continuous casting of killed steel in 130-mm-square billets in straight and curved lines in the horizontal position on a semi-industrial type UNRS [Ustanovka dlya Nepreryvnoy Razlivki Stali -- Continuous Steel Casting Installation].

"In the variant with a curving line and subsequent cutting of the metal with flying shears, the over-all height of the installation is lowered to 9-12 m (instead of the usual 18-25 m); the design is simplified considerably and costs are reduced to a minimum. A working speed of 1.6-2.0 m/min makes it possible to produce approximately 15 T/hr on one line.

"General-purpose carbon steel, high-grade construction steel, and other high-grade and alloy steels were cast (in accordance with GOST 4543-48). The cast blooms and standard rolled shapes from them (squares, strip, intricate shapes) met the specifications in the standards.

"Construction of such UNRSs can be recommended at plants, the merchant bar mills of which are rolling billets with a cross section of approximately 130 x 130 mm."

58. Technology for Continuous Casting of Carbon Steel

"At the Scientific Research Institute of Metals -- Development and Introduction of a Technology for Continuous Casting of Carbon Steel (jointly with the Donesk Metallurgical Plant)," by V. I. Dorokhov; Moscow, Stal', No 12, Dec 62, p 1087

"A technology has been perfected for continuous casting of killed and rimmed carbon, shipbuilding, and high-grade construction steels in slabs with cross sections of 175 x 700, 200 x 800, and 200 x 1,000 mm; 89% of the sheet rolled from metals melted in the open-hearth shop is made of these steels. Plans for operation of the UNRS [Ustanovka dlya Nepreryvnoy Razlivki Stali -- Continuous Steel Casting Installation] in 1961 have been surpassed. The output of satisfactory sheet was 10% higher than that from ordinary ingots.

"At the end of 1961, St.3 and St.2 sheet steel was being cast in the UNRS.

"Investigations were conducted on continuous casting of shipbuilding steels St.3s (up to 0.18% C) and St.4s (up to 0.18% C and 0.50% minimum of Mn), construction steels 10 and 15, and rimmed steels St. 3kp and St.2kp.

"The mechanical properties of products rolled from these steels meet the specifications in the standards.

"Considerable difficulties were encountered in the continuous casting of bridge construction steel St.3m and the low alloy steel 09G2.

"The main defects of cast slabs of all killed steels consisted of nonmetallic and slag inclusions on the surfaces, external and axial internal cracking. New specifications were established for secondary cooling (total water consumption rate, 1.1 l/kg; ratio of consumption as to the sides, 4-6), as the result of which practically no axial cracking appeared. A deoxidation procedure was investigated which made it possible to produce sheet with a minimum quantity of nonmetallic surface inclusions.

"Zirconium oxide and high-alumina pouring nozzles, manufactured according to a technology of the UNIIO [Ukrainskiy Nauchno-Issledovatel'skiy Institute Ogneuporov -- Ukrainian Scientific Research Institute of Refractories], eroded insignificantly during the pouring of killed and rimmed steels and are recommended for application.

"New instruments for measuring the level of metal in the intermediate ladle and crystallizer and auxiliary mechanisms for controlling the stoppers of the pouring ladles have been tested successfully, jointly with the Institute of Automation, Gosplan Ukrainian SSR.

Corrosion

59. Corrosion of In-Tl and In-Sn Alloys

"Investigation of the Corrosion Properties of In-Sn and In-Tl Alloys," by I. D. Vdovenko and N. A. Bogacheva, Academy of Sciences Ukrainian SSR; Kiev, Mashinostroyeniye, No 4, Jul-Aug 62, pp 70-72

The corrosion resistance of In-Sn alloys to H_2SO_4 and In-Tl alloys to HCL and NaCl was studied to determine which alloys could be recommended for industrial use.

Data from corrosion tests showed that In-Tl alloys are best suited for dilute solutions of HCl and NaCl. In 20% HCl solution In-Tl alloys should contain more than 50% thallium. In-Sn alloys are sufficiently resistant to attack in dilute H_2SO_4 but in 60% H_2SO_4 at least 80% tin would be required to reduce the corrosion rate to a minimum. Average weight loss per hour for the two alloy systems studied was approximately 0.3 g/m².

60. High-Temperature Oxidation of Titanium Nitride

"Oxidation of Titanium Nitride in Dry and Humid Air," by I. V. Fedoseyev and O. G. Nemkova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 5, May 62, pp 980-982

The behavior of titanium nitride in dry and humid air at high temperatures was studied not only from a scientific standpoint but also from a practical aspect.

The oxidation of titanium nitride (specific surface: 1,500 cm²/g) was studied in dry and humid air in the temperature interval, 600-750° C the oxidation rate is too rapid, making it impossible to plot an oxidation curve. Air containing up to 6% water vapor had no effect on the nature or rate of oxidation, whereas water vapor in an excess of 6% showed considerable influence on the energies of activation of the oxidation reaction and diffusion.

Crystallography

61. Calculation of Irradiation Defects in Single Crystals

"Relationship of the Number of Defects to the Direction of Irradiation in a Single Crystal," by M. V. Fedulov, Institute of Metallography and the Physics of Metals, Central Scientific Research Institute of Ferrous Metallurgy; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 1, Jul 62, pp 10-16

The relationship of the number of defects to the direction of irradiation of single crystals by electrons and gamma-quanta was investigated. Approximation formulas were derived and a numerical calculation was made showing considerable angular asymmetry for the probability of the formation of Frenkel electron pairs during the irradiation of copper single crystals.

62. New X-Ray Unit for Studying Solids in Compression

"On the Question Concerning X-Ray Research of Substances Under High Pressure -- 2. Apparatus for Obtaining X-Ray Diffraction Patterns of Powders at Pressures up to 18,000 kg/cm²," by A. P. Frolov, L. F. Bereshchagin, K. P. Rodionov, and M. I. Oleynik, Institute of Metal Physics, Academy of Sciences USSR, Institute of High-Pressure Physics, Academy of Sciences USSR; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 1, Jul 62, pp 80-84

A general description is given for a new device designed to obtain X-ray diffraction patterns of solids under pressure to enable researchers to study parameter changes in crystal lattices, mechanisms occurring during compression of solids, and other principles in the behavior of crystal structures under pressure.

63. Propagation of Dislocations by Phase Transformation

"Evolution of Dislocation Structures in Phase Transformations," by L. I. Mirkin, Scientific Research Institute of Mechanics, Moscow State University imeni M. V. Lomonosov; Doklady Akademii Nauk USSR, Vol 142, No 6, 21 Feb 62, pp 1289-1290

The theory that dislocations present in a high-temperature phase of a metal, particularly steel, are a source of new dislocations following a phase change was studied.

Steels containing 0.3% C, 2-3% Cr, and 8% W were subjected to various thermal and mechanical treatments. X-ray analysis of the tests showed the following results:

<u>Treatment</u>	<u>Density of Dislocations (10¹¹ cm⁻²)</u>	<u>Hardness (kg/mm²)</u>
Cold rolled, 60%	8	350
Quenched from 1,000° C, annealed at 250° C	20	580
Heated to 1,000° C, cooled to 500-550° C, quenched, annealed at 250° C	20	--
Heated to 1,000° C, cooled to 550-600° C, cold rolled 60%, quenched, annealed at 250° C	48	840

The dislocation* density of steels can be reduced by extending the heating time in the gamma-region or by supercooling to 500° C before quenching [marquenching].

From this study it was concluded that the dislocation density of steels increases with the transformation from austenite to ferrite but this phenomena can be controlled with the proper treatment.

64. Studies of Dislocations in Germanium Crystals Under Compression

"Effect of Annealing on Dislocation Density and Compression Curves of Single Germanium Crystals," by V. G. Govorkov and V. S. Papkov, Institute of Crystallography, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 7, Jul 62, pp 1846-1852

Experimental data on the effect of annealing on dislocation density and [stress-strain] compression curves were obtained for germanium crystals. Annealing of compressed germanium specimens at 890° C for 2.5 hours caused a regrouping of the dislocations which led to the formation of centers of crystallization, the disappearance of a clearly defined yield point, and a lowering of the yield strength. Microscopic analysis showed that the yield point was not associated with the start of plastic deformation, traces of which appeared much earlier, and that the yield point was independent of the forces exerted by impurity atoms on the initial dislocations.

65. Study of Creep in Nickel Crystals

"Creep Studies in Single Crystals of Nickel," by V. M. Rozenberg, Institute of Metallography and the Physics of Metals, Central Scientific Research Institute of Ferrous Metallurgy; Sverdlovsk, Fizika Metallov i Mettallovedeniye, Vol 14, No 1, Jul 62, pp 114-120

Creep in single crystals of nickel at 670-770° C and at shear stresses of 350-1,190 g/mm² was studied. An exponential expression based on Weertman's theory of creeping dislocations was formulated from the data obtained.

66. Tensile Strength of Whiskers

"Tensile Testing of Thread-Like Crystals of Copper, Nickel, and Cobalt," by S. Z. Bokshteyn, S. T. Kishkin, and I. L. Svetlov; Leningrad, Fizika Tverdogo Tela, Vol 4, No 7, Jul 62, pp 1735-1742

Optimum conditions for growing whiskers of copper, nickel, and cobalt by reduction of the metal halide with hydrogen and a general description of a whisker-tensile-testing machine are given.

In most instances, the crystals with smaller diameters (3-5 microns) had greater tensile strengths. This anomaly was believed to be related to statistically distributed defects in the form of edge and screw dislocations, vacancies, and impurity atoms which have less chance of occurring in whiskers of smaller diameter.

67. Twinning in Mo-Re Single Crystal

"Mechanism of Twinning in the Deformation of Single crystals of Mo-35 at. % Re," by Ye. M. Savitskiy and Tao Tszu-Tsun, Institute of Metallurgy Imeni A. A. Baykov; Sverdlovsk, Fizika Metallov i Mettallovedeniye, Vol 14, No 1, Jul 62, pp 148-150

The mechanism of twinning in single crystals was investigated in Mo-35 at. % Re crystals grown by zone refining with an electron beam in a vacuum. The refined crystals were strained 2% where subsequent microscopic examinations showed traces of twinning on the surface of the crystal along the (112) plane in the [111] direction.

Patents

68. Recent Soviet Patents in the Field of Metallurgy

I. "Authorship Certificates," Byulleten' Izobreteniy, No 14, Jul 62

Class 7c, 10. No 148780. B. A. Cherepennikov, "Method of Stamping by Means of an Explosion With a Gaseous Explosive Substance."

Class 21h, 18₁₀. No 148856. V. M. Zil'berman, "Vacuum High-Frequency Induction Furnace."

Class 42h, 26. No 148927. I. N. Rubtsov, V. A. Podgornov, and I. I. Savel'yev, "Instrument for Determining the Crystallographic Orientation of Single Crystals."

Class 49h, 25. No 149020. Yu. V. Naydich and V. N. Yeremenko, "Method of Bonding Ceramic Items."

Class 49h, 26₀₂. No 149022. S. N. Lotsmanov, M. V. Mal'tsev, I. K. Sklyarov, V. V. Tipikin, I. P. Chekunov, S. I. Chizhov, B. S. Tikhonov, Z. A. Smirnova, V. I. Kolesnikova, N. A. Bulanov, and A. I. Novikov, "Braze for Brazing a Hard Alloy Cutting Tool."

II. "Authorship Certificates," Byulleten' Izobreteniy, No 15,
Aug 62

Class 40a, 46₀₁. No 149224. N. A. Belozerskiy and O. D. Krichevskaya, "Method of Obtaining Carbonyls of the Metals Chromium, Molybdenum, and Tungsten and Producing Powders of These Metals."

Class 80b, 8₁₇. No 149343. M. G. Trofimov, S. M. Titkov, M. Ya. Telis, K. V. Kalmykov, and V. Z. Kheysin, "High-Stability Refractory Masses for Linings (Crucibles) of Induction Furnaces."

III. "Authorship Certificates," Byulleten' Izobreteniy, No 17,
Sep 62

Class 21g, 32. No 149838. A. S. Gladkikh and V. V. Trofimova, "Powder Metal Electrical Contacts."

Class 40b, 20. No 149883. M. Ye. Drita, M. V. Zakharov, Z. A. Sviderskaya, V. F. Trokhova, E. M. Drita, I. I. Gur'yev, N. P. Dronova, and V. V. Solov'yeva, "Deformable Magnesium Alloy."

Class 40c, 8. No 149885. M. I. Zakharov, B. L. Koshurnikov, and G. M. Itel'son, "Method of Manufacturing Nickel Anodes for the Electrolytic Production of Nickel."

IV. "Authorship Certificates," Byulleten' Izobreteniy, No 18,
Sep 62

Class 40d, 1₁₀. No 150231. M. V. Zakharov and L. N. Rogel'berg, "Method of Heat Treating Deformable Aluminum-Magnesium Alloys With a High Magnesium Content."

V. "Authorship Certificates," Byulleten' Izobreteniy, No 19,
Oct 62

Class 12i, 17. No 150495. N. A. Bul'yenkov, K. A. Bol'shakov, P. I. Fedorov, and M. S. Tsirlin, "Method of Making Semiconductor Materials."

Class 12n, 8. No 150497. I. N. Popkov, I. N. Plaksin, and G. V. Kuzmichev, "Method of Extracting Iridium From Industrial Solutions."

Class 18b, 23. No 150532. V. P. Lysenko, "Split Die for Two-Directional Pressing of Powder Metal Items."

Class 18c, 2₅₀. No 150533. V. I. Shvarts, M. A. Leonov, Ye. B. Brovchenko, and V. A. Shakhnovich, "High-Temperature Casting Alloy."

Class 40b, 18. No 150634. I. I. Novikov, M. V. Zakharov, and Ye. I. Rytvin, "High-Strength Aluminum Alloy for Sand Casting."

Class 49h, 25. No 150740. I. I. Il'yevskiy and N. S. Kochukov, "Method of Brazing."

Class 49h, 25. No 150741. I. I. Metelkin, K. K. Artemova, and V. P. Skal'skaya, "Braze for Brazing Sital With Metals."

Class 49m, No 150743. N. G. Yudin, "Continuous Spark-Erosion Method of Machining."

VI. "Authorship Certificates," Byulleten' Izobreteniy, No 20, Oct 62

Class 21g, 32. No 150953. N. N. Smaga, V. P. Kormiyenko, and B. A. Yudin, "Method of Preparing the Charge for Powder Metal Contacts."

Class 21h, 29₁₁. No 150857. L. N. Kaganov, "Spot and Roller Method of Welding Refractory Metals."

Class 31c, 3. No 150983. L. A. Tseytlin, L. A. Eltysheva, N. I. Grafas, A. I. Shafarenko, B. Yu. Shagalova, and A. S. Tsyganov, "Mass for Lining the Crucibles of Induction Furnaces."

Class 31c, 8₀₇. No 150984. A. A. Lesyusis, A. M. Karnaukh, G. I. Mikhaylenko, M. V. Yershova, T. T. Bezsalov, and M. Ya. Vasil'yev, "Mass for the Preparation of Patterns for Precision Casting."

Class 31c, 15. No 150986. G. I. Eskin and V. I. Slotin, "Apparatus for Precision Casting."

Class 31c, 21. No 150988. V. S. Pravdin, V. A. Kazanskiy, P. V. Bobrov, V. S. Rutes, D. P. Yevteyev, and V. P. Druzhinin, "Crystallizer for Continuous Casting of Steel."

Refining

69. Czechoslovak Zone Melter

"Zone Melter," Nepszeru Technika, Budapest, Nov 62, Vol XI, No 11, back cover

Czechoslovak industry has now begun series manufacture of a new zone melter for refining of germanium, silicon, and indium. The protecting gas used is hydrogen, argon, nitrogen, or helium. The equipment can refine a 700-800-gram piece of germanium in 16 hours.

70. High-Temperature Vacuum Distillation of Metals

- * "Refining Gallium, Indium, and Thallium From Mercury, Cadmium, and Zinc by High-Temperature Vacuum Distillation," by A. A. Shokol and L. F. Kozin, Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR; Kiev, Ukrainskiy Khimicheskii Zhurnal, Vol 28, No 6, 1962, pp 699-702

High-temperature vacuum distillation of mercury, cadmium, and zinc from gallium-, indium-, and thallium-based alloys was efficiently accomplished by utilizing the large differences in order of magnitude for the vapor tension of the metals involved. This single physical property permitted distillation of Hg, Cd, and Zn from the Ga, In, and Th alloys by maintaining them at a constant temperature in a vacuum for 4 hours. Tests were conducted at 500, 800, 1,000, and 1,200° C. A check of the alloys tested at 1,000° C showed only minute quantities of the impurity metals (1×10^{-4} - 2×10^{-5} wt. %), while the alloys subjected to distillation at 1,200° C contained no detectable amounts of impurity metals.

Specialized Testing71. Coercive-Force Measurements on Rolled Powder Strips of Magnetically Soft Materials

- "Relationship of the Coercive Force of Magnetically Soft Materials to the Thickness of Sheet Made From Rolled Powders," by O. A. Katrus, Institute of Metallo ceramics and Special Alloys, Academy of Sciences Ukrainian SSR; Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 14, No 1, Jul 62, pp 137-139

A study on the relationship of coercive strength to the thickness of rolled powder strips was conducted on reduced nickel and iron, carbonyl nickel, and permalloy specimens. Results showed that the relationship of the parameters mentioned are not clearly defined for the powdered samples as for ordinary rolled strip. Graphs for the materials tested showed that there is little change in coercive force from 500 to 20 micron thickness. Below 20 microns the coercive force rises sharply.

72. Fatigue Testing by Electromagnetic Oscillation

"Electromagnetic Unit for Testing the Fatigue Strength of Flat Shapes in a Vacuum," by I. A. Oding, V. S. Ivanova, L. K. Gordiyenko, and V. N. Stepanov, Institute of Metallurgy imeni A. A. Baykov; Moscow, Zavodskaya Laboratoriya, Vol 28, No 9, 1962, pp 1126-1128

A unit for testing fatigue strength of metals in a vacuum is described. Oscillation of the enclosed test pieces is caused by an alternating electromagnetic field of 50 cps. Observations of the specimen during testing and measurement of vibrations are done with the aid of a cathetometer.

Testing in a vacuum with the use of the cathetometer makes it possible to maintain a continuous check on the behavior of the specimen without repolishing and repeated etchings of the specimen surface.

73. Surface Tension Measurements of Molten Neodymium

"Experimental Determination of the Surface Tension of Molten Neodymium," by V. B. Lazarev and A. V. Pershikov, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep-Oct 62, pp 143-144

To corroborate theoretical calculations on the surface tension of rare-earth elements, the surface tension of neodymium was determined experimentally. Special beryllium oxide and tantalum funnels were used in filtering neodymium oxide prior to surface tension measurements. For the actual experiment beryllium oxide crucible and capillaries were used with a heating cylinder of sheet tantalum. Both filtering and melting operations were done in a vacuum (1×10^{-5} mm Hg). Eight surface tension measurements were made in the temperature range of 1,030-1,186° C. Values of the surface tension with the specified temperature range were 688 dyne/cm down to 674 dyne/cm, respectively. Calculations from the experiment, using the method of successive approximations, were based on the effective radii of the capillaries.

74. Unit for Measuring Internal Friction and Shear Modulus of Metal and Alloy Wire at High Temperatures

"A Unit for Measuring Internal Friction and Shear Modulus at High Temperatures," by V. P. Yelyutin, A. V. Panov, A. K. Natanson, V. I. Shulepov, and O. A. Vasil'yev, Moscow Institute of Steel and Alloys; Moscow, Zavodskaya Laboratoriya, Vol 28, No 9, 1962, pp 1123-1126

A unit for measuring internal friction and shear modulus of wire 0.2-1 mm in diameter at temperatures up to 2,500° C while under stress is described.

A cross-section diagram of the unit is given along with a description of the parts and type of materials used. Accessory equipment includes vacuum pumps which may be used if desired and an oscillograph for automatically recording the vibration amplitudes of the wire specimen under load.

Theory of this unit is based on the fact that the shear modulus is directly proportional to the square of the vibration frequency of the wire specimen determined in the process of measuring the internal friction. The internal-friction magnitude is calculated from the formula.

$$Q^{-1} = \frac{1}{n} \ln (A_k / A_{k-n})$$

where A_k and A_{k-n} are the initial and final vibration amplitudes for a given number of vibrations.

Miscellaneous

75. Comparative Study of Rhenium Alloys

"Effect of Metallic Admixtures on the Physical and Mechanical Properties of Rhenium," by Ye. N. Savitskiy, M. A. Tyikina, and G. Ye. Chuprikov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 9, Sep 62, pp 2272-2274

Rhenium (99.99% pure) alloyed with W, Mo, or Fe in amounts up to 0.1% was tested to determine the effect of alloying elements on the physical and mechanical properties of rhenium. Of the three metals used, tungsten was found to have the greatest effect, followed by molybdenum and iron, respectively.

Also checked in this work was the effect of small quantities of oxygen (0.009%) on the properties of rhenium. It was found that oxygen in the amount given has an effect as great as or greater than a 0.1% content of the metallic elements. Data given below exemplify this point:

Alloying Constituent	Resistivity (Microohm-cm)	Tensile Strength (kg/mm ²)
Rhenium (99.99%)	19.85	67.0
W (0.1%)	19.92	68.4
Mo (0.1%)	20.06	71.1
Fe (0.1%)	21.2	72.1
O ₂ (0.009%)	21.8	72

76. Age-Hardening Problems of EI-726 Austenitic Stainless Steel

"A Practical System of Deformation and Heat Treatment of a Heat-Resistant Austenitic Steel," by M. P. Braun, Doctor of Technical Sciences, and Engrs B. B. Vinokur, N. I. Matyushenko, and V. P. Manuylova, Institute of Foundry Production, Academy of Sciences Ukrainian SSR; Kiev, Mashino-stroyeniye, No 4, Jul-Aug 62, p 32-36

Experimental work was conducted on austenitic stainless steel EI-726 in an effort to determine a practical method of hardening by a combined process of hot working and heat treating.

An experimental heat of EI-726 steel (0.09% C, 14.56% Cr, 19.43% Ni, 1.53% Mn, 1.03% Nb, 2.34% W, 0.0115% B, and 0.08% Ce) was produced and subjected to various degrees of hot working, quenching, and aging. In most instances recrystallization did not occur at the aging temperatures or the aging time was too lengthy to be feasible. Chemical and X-ray analysis showed that only one carbide (NbC) was formed to a limited extent.

A process involving 30-40% hot deformation with subsequent aging at 1,100-1,150° C for 7-8 hours produced a fully recrystallized structure with uniform grain size. In this process no cooling or quenching step was used and it was concluded that EI-726 steel is unsuitable for aging after quench hardening. However, the process described above was not accepted as being practical and further investigations were considered necessary to develop a process suitable for industrial application.

77. Composition and Magnetic Properties of Cobalt-Gadolinium Alloys

"Phase Diagram of the Cobalt-Gadolinium System," by Ye. M. Savitskiy, V. F. Terekhova, and I. V. Burov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2572-2574

The Co-Gd phase diagram was constructed with the aid of the usual metal-study procedures. Analysis of the system confirmed the existence of six previously determined compounds, $GdCo_5$, $GdCo_4$, $GdCo_3$, $GdCo_2$, $GdCo$, and Gd_3Co , and established the existence of a new compound, Gd_2Co_{17} . Microhardness of these alloys ranges from 730 kg/mm² for Gd_2Co_{17} to 245 kg/mm² for Gd_3Co , with the hardness of the other compounds falling within this range. Two eutectic and six peritectic reactions were found to occur in this system. Measurement of the magnetic properties of the system showed that addition of gadolinium sharply reduces the specific magnetization of cobalt at room temperature. A table is given in the text to compare the specific magnetization and coercive forces of the compounds and pure cobalt and gadolinium.

78. Composition Diagram of Nb-W-Zr System

"Composition Diagram of the Nb-W-Zr Ternary System," by Ye. M. Savitskiy and A. M. Zakharov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2575-2580

An investigation of the Nb-W-Zr ternary system was conducted, from which it was found that the joint solubility of tungsten and zirconium in niobium in the solid state is limited and diminishes with decreasing temperature. Much of the discussion is devoted to the W-Zr binary portion of the system, which features the peritectic transformation ($L + W_2Zr \rightarrow Nb_2Zr$) and the eutectic reaction ($L + Nb_2Zr \rightarrow W_2Zr$) where W_2Zr (BCC) was found to be the hardest compound formed in the system having a microhardness of 778-804 kg/mm².

79. Industrial Applications of Spark-Erosion Machining

"Spark-Erosion Machining of Gas-Turbine Runners," by
A. B. Sosenko; Moscow, Stanki i Instrument, No 6,
Jun 62, pp 16-20

Industrial application of spark-erosion machining of complicated shapes such as turbine runners, vanes, etc. are described and the machinability of various steels and alloys by this method are discussed, together with mathematical relationships for calculating current strengths, feed rate; erosion rate, surface area affected, etc.

The report specifically investigated the spark-erosion machining of steels 45 and 5KhNV and heat-resistant alloys EI 661, EI 617, and EI 437.

Factors involving the use of spark-erosion machining on thin-wall parts and the selection of an optimum system for machining complex shapes is presented, along with the various types of electrode cutting tools made of copper, aluminum, and EFG graphite.

80. Investigation of Palladium-Gold-Nickel System

"Investigation of Palladium-Gold-Nickel Alloy System,"
by A. T. Grigor'yev, L. A. Panteleymonov, V. V. Kup-
rina, G. V. Goldobina, and M. A. Rudnitskiy; Moscow,
Zhurnal Neorganicheskoy Khimii, Vol 7, No 5, May 62,
pp 1110-1116

Alloys of the Pd-Au-Ni system were studied in relation to their thermal properties, hardness, microstructure, resistivity, and temperature coefficient of resistance. It was shown that alloys of this system form a continuous series of solid solutions. In the mechanical properties-composition diagrams the hardness and resistivity curves of binary alloys were found to be symbatic, while curves for temperature coefficient of resistance were antibatic.

81. Reactions of PrCl_3 With NaCl and KCl

"Study of the Reactions of Praseodymium Chloride With Sodium and Potassium Chlorides in Melts," by Z. N. Shevtsova, Ye. N. Korzina, and B. G. Korshunov, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 11, Nov 62, pp 2596-2599

The PrCl_3 - NaCl - KCl system was studied to determine the conditions for treating complex rare earths for the production of metallic praseodymium by electrolysis in a chloride bath. This particular system is characterized by three 4-phase equilibrium points. Composition of the equilibrium phases and temperature at which they occur are given in the text.

82. Solid State Transformations in Cr-Fe System

"Solid State Transformations in Alloys of the Cr-Fe System," by A. T. Grigor'yev, Ye. M. Sokolovskaya, L. I. Pyatigor'skaya, and M. V. Maksimova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 7, No 5, May 62, pp 1105-1109

Microstructural investigations of the chromium-iron system showed that there are five single-phase regions and four 2-phase regions in the chromium-rich portion of the phase diagram for this system. In the middle portion of the diagram at 26, 37, and 48 at.% Fe there are eutectoid transformations at 250° , 430° , and 680° C, respectively.

* * *



Washington, D.C. 20505

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

A handwritten signature in cursive script, appearing to read "Sergio N. Alcivar".

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)



Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0463342	78-03109A	55	1	2	88	Consolidated Translation Survey For April 1965	4/1/1965	190	Approved For Release	3/25/2004
AD0465168	78-03109A	55	1	3	89	Consolidated Translation Survey For May 1965	5/1/1965	245	Approved For Release	3/25/2004
AD0467068	78-03109A	55	1	4	90	Consolidated Translation Survey For June 1965	6/1/1965	221	Approved For Release	3/25/2004
AD0468849	78-03109A	55	1	5	91	Consolidated Translation Survey For July 1965	7/1/1965	218	Approved For Release	3/25/2004
AD0471155	78-03109A	55	1	6	92	Consolidated Translation Survey For August 1965	8/1/1965	236	Approved For Release	3/25/2004
AD0473500	78-03109A	55	1	7	93	Consolidated Translation Survey For September 1965	9/1/1965	221	Approved For Release	3/25/2004
AD0474384	78-03109A	55	1	8	94	Consolidated Translation Survey For October 1965	10/1/1965	181	Approved For Release	3/25/2004
AD0475860	78-03109A	55	1	9	95	Consolidated Translation Survey For November 1965	11/1/1965	305	Approved For Release	3/25/2004
AD0477388	78-03109A	56	1	1	96	Consolidated Translation Survey For December 1965	12/1/1965	181	Approved For Release	3/25/2004
AD0478471	78-03109A	56	1	2	97	Consolidated Translation Survey For January 1966	1/1/1966	198	Approved For Release	3/25/2004
AD0479675	78-03109A	56	1	3	98	Consolidated Translation Survey For February 1966	2/1/1966	354	Approved For Release	3/25/2004
AD0481681	78-03109A	56	1	4	99	Consolidated Translation Survey For March 1966	3/1/1966	237	Approved For Release	3/25/2004
AD0334379	78-03117A	191	1	37	4255	Status And Activities Of Prominent Scientists In Communist China In 1962	1/29/1963	53	Approved For Release	3/29/2004
AD0333974	78-03117A	190	1	35	4212	Scientific Information Report Outer Mongolia (1)	1/17/1963	27	Approved For Release	3/29/2004
AD0335202	78-03117A	195	1	13	4394	Scientific Information Report Outer Mongolia (2)	3/13/1963	27	Approved For Release	3/25/2004
AD0332657	78-03117A	183	1	13	3924	Scientific Information Report Biology And Medicine (22)	10/12/1962	76	Approved For Release	3/29/2004
AD0333147	78-03117A	185	1	30	4020	Scientific Information Report Biology And Medicine (23)	11/16/1962	90	Approved For Release	3/29/2004
AD0333427	78-03117A	188	1	13	4112	Scientific Information Report Biology And Medicine (24)	12/13/1962	84	Approved For Release	3/29/2004
AD0334160	78-03117A	190	1	10	4187	Scientific Information Report Biology And Medicine (25)	1/10/1963	69	Approved For Release	3/29/2004
AD0334612	78-03117A	193	1	10	4310	Scientific Information Report Biology And Medicine (26)	2/20/1963	112	Approved For Release	3/29/2004
AD0335309	78-03117A	195	1	32	4413	Scientific Information Report Biology And Medicine (27)	3/20/1963	110	Approved For Release	3/29/2004
AD0336242	78-03117A	198	1	16	4509	Scientific Information Report Biology And Medicine (28)	4/12/1963	81	Approved For Release	3/29/2004
AD0332575	78-03117A	184	1	6	3957	Scientific Information Report Chemistry And Metallurgy (22)	10/23/1962	47	Approved For Release	3/29/2004
AD0333164	78-03117A	187	1	2	4061	Scientific Information Report Chemistry And Metallurgy (23)	11/28/1962	65	Approved For Release	3/25/2004
AD0333857	78-03117A	189	1	22	4160	Scientific Information Report Chemistry And Metallurgy (24)	1/2/1963	57	Approved For Release	3/29/2004
AD0334310	78-03117A	191	1	20	4238	Scientific Information Report Chemistry And Metallurgy (25)	1/28/1963	52	Approved For Release	3/29/2004